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Clockit Timecode ACC 501 Controller

Operating Manual

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1. Introduction

Superseding the ACC101 the Clockit Controller ACC501 retains all its functions and serves as a general purpose TC master unit which can read, generate and compare and tune to all kind of TC rates.

It offers a variety of addtional features such as word clock output, dual TC display, enhanced GPS modes and multiple I/O ports including USB ports for PC/Mac connectivity and TC-conversion modes.

Although roughly half of the size of its predecessor the user interface has been vastly improved using a graphical display and an enhanced keypad with dual navigational cursor pads for easy two-handed operation.

Power can be provided over internal batteries, USB or an external source. One load of 4 good quality alkaline AA cells should achieve over 24 hrs. of continuous use (depending on activity and brightness of display backlight), and many days in a typical scenario of intermittent use. For increased battery lifetime a special standby mode has been implemented. While the main MCU controls the main time code generator, keypad, display and memory functions, a special low-power MCU monitors the power converters and an auxiliary generator is maintaining frame accurate time code when put in standby for the full battery life of the Controller (one week or more).

To allow for even more flexible implementation of future enhancements, the hardware has been purposely designed to cater for new features without major hardware updates.
User-manageable software updates will become available from the product page on http://www.ambient.de/en/products/ambient-recording/clockit-timecode/acc-501/acc-501-software.html so please check back for software updates and change logs.

Updating the software is done via a Windows PC over USB running a dedicated programming tool also available from the aforementioned source.

2. Description

2.1 Lemo 5 pin, common industry TC standard

Pin 1 Ground
2 TC in, nominal level 100 mV min., DC decoupled
3 Aaton ASCII protocol in/out
4 Tune signal @ 1.92 MHz, (DC in 5 to 12 Volts for Rev. A boards)
5 TC out, TTL level

2.2 IR - Infrared Port

For setting compatible Clockit devices and data transfer using Aaton ASCII protocol without the need of linking the units via 5 pin Lemo, typical range 4 ft

2.3 BNC, EXT. SYNC

This input will accept sync signals such as composite video PAL, NTSC or trilevel sync and analyze/ identify them providing vertical sync and field number signals in future software revisions.
In the current software revision, a PAL video signal can be used to tune the reference oscillator. Thus, Lockit boxes can be recalibrated to match the speed of an OB van or house sync providing frame accurate sync of hardwired and portable equipment. The total time code drift and diversion of a working system is minimized for most ease in edit.

2.4 BNC, WCLK

The word clock output is in sync to the internal time code reference generator which makes it most useful when synchronizing equipment like stand alone audio recorders or DAWs.
44.1 KHz to 192 KHz with pull up and pull down are available.

2.5 USB 1

Used for programming new software or as serial interface for SMPTE/P2 conversion.
EXT power in, 5 Volts.

2.6 USB 2

Serves as MIDI TC I/O interface for sending MTC (Midi time code) to a DAW.
EXT power in, 5 Volts.

The Mini B USB ports follow the USB specification. It is recommended to have the Controller powered on with the appropriate operation mode selected when establishing the connection to a computer.

Do not connect to two computers simultaneously!

2.7 3.5mm Mini jack, TC in/out

Offers a separate LTC input/output carrying the same TC signal as the Lemo TC socket with a reduced level of 1 Volt peak to peak.

Tip = LTC-OUT
Ring = LTC-IN
Sleeve = Ground

2.8 Sub D 15 pin socket, accessory I/O interface

This socket is for general access to the Controller and contains all connections needed to interface to an external device including power. This socket can be used to connect the ACCSI (Ambient Serial Interface) with attached GPS module. Various options like radio link transceivers etc. to follow.

Only connect approved accessories to avoid damage.

2.9 Keypad

The keypad is organized with the ***menu*** and ***command*** cursors on the right and ***general editing cursors*** on the left. These keys can double as ***hold/log*** when logging on the fly.

There is a red ***escape*** key on the left which doubles as an ***on/off switch*** and a green ***enter*** key on the right. Underneath there are ***0-9 number*** keys in black with ***secondary functions*** in red and a ***shift*** key on the left. The 4 domed Allen screws protect the keypad surface.

2.10 Display

The display is a 128 X 64 pixel graphic display with selectable contrast. The white LED backlight can be adjusted in intensity and turned off completely for reducing the power consumption. The display is organized with a menu bar at the top and a command bar at the bottom. Movement within these bars is done by 4 cursor keys at the right of the display, two keys for left/right scroll for the menu bar at the top and 2 keys, left/ right scroll for the command bar at the bottom. The relevant status of the controller is shown in the remaining space between these bars.

A command is executed by selecting the respective command and then pressing **ENTER** or pressing the relating numeric hot-key shown in the command bar. **ESC** returns to the command line.

Battery symbol
This shows only the level of the internal 4xAA batteries, not the external source, for this see Power Supply in the “Config” menu.
We welcome any comments or software ideas for this new controller. Please get in touch with us for your suggestions.

3. Getting Started

Take the Controller out of its pouch and open the sliding door on the left side. Insert 4 AA cells carefully observing the polarity as indicated on the side panel, the 2 cells in the outer slot facing both positive polarity outwards, the 2 cells in the inner tube positive polarity inwards. Then close the contact hinge and slide the door shut.

The controller is designed to interface properly with other products of Ambient Recording's Clockit range. When connecting to 3rd party's equipment carefully consult the referring user manuals for requirements to evaluate the possibility of proper interfacing. Follow the manufacturer´s instruction to the letter and only use the designed inputs with certified cables. Ambient cannot be held liable for any damage or malfunctions caused by improper set up and/or cabling.

SWITCHING THE UNIT ON AND OFF

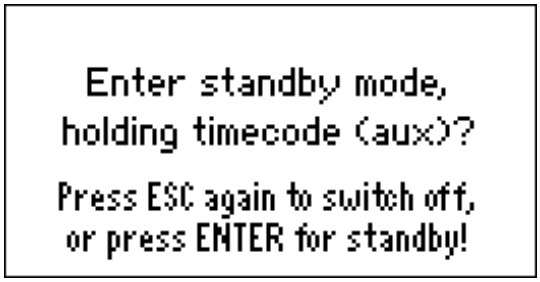
A delay has been implemented to avoid inadvertent On/Off switching.

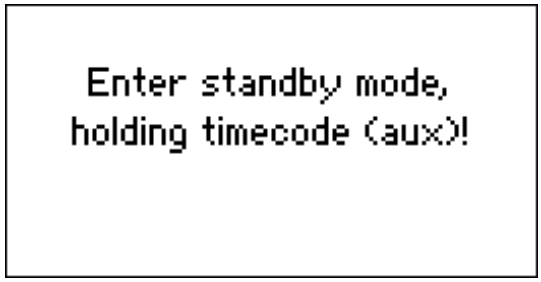
POWERING ON

Press the **ESC** (On/Off) key (red flash symbol) until the unit initializes displaying serial No. and software version. After a few seconds the display changes to default with the time code generator screen **(GEN)**.

POWERING OFF

When switching off either standby or a complete power-down can be selected. In standby mode the time code is held in the auxiliary TC generator (AUXGEN) that runs off the accurate internal reference while power-off helps to save battery life and is intended for long time no-operation.
Press the **ESC** key. After a short delay the switch-off select menu will appear.

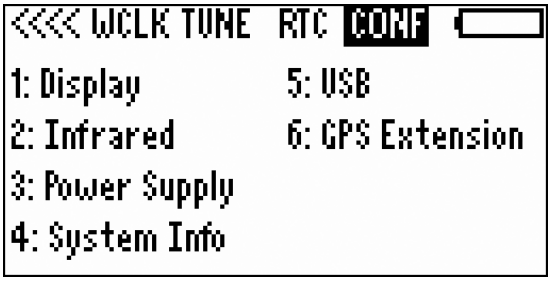




press ESC again:
Unit is powered off for maximum save of battery capacity, time code is lost.
press Enter:
Unit enters standby mode, AUXGEN holds TC until batteries are drained completely.

4. Menus

4.1 CONF menu



This is a general menu for the controller status and control and monitoring of peripherals.

Select option by pressing corresponding number.

1: Display:

Change display contrast and default backlight brightness and switch off time.

2: Infrared:

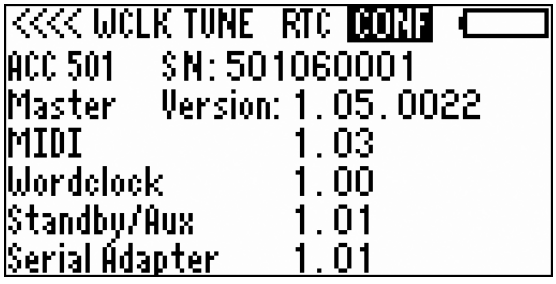
Displays transceived ASCII characters, allows for a test and reset.

3: Power supply:

Shows voltages at power inputs.

4: System Info:

Shows the serial number of the unit and the software versions of the various modules currently loaded.
Upon start up, the ACC501 checks if a ACCSI (Ambient Serial Interface) is connected and displays the firmware version:



Please note: From board revision “A” on the revision is displayed next to the serial number.

5: USB Port Settings:

USB Port 1 can be set to:

1. Standard mode (Ambient XDOP):

Used for programming and computer connection

2. Sony P2:

On the virtual COM Port that appears in your hardware settings when the ACC501 is connected, a Sony P2 protocol is being emulated. Thus the ACC501 can be recognized by editing programs (AVID express, Media Log) as a virtual machine and the time code be used for logging etc.

Please note: The Com-Port drivers (PC) / extensions (Mac) matching your system need to be installed to use option 2.
Download from:
http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx

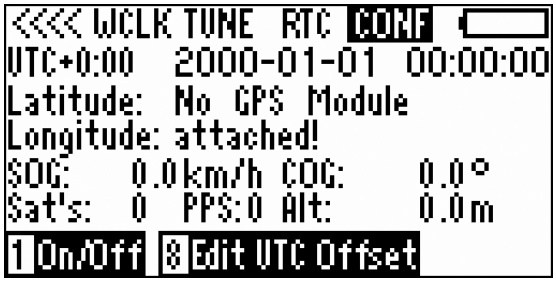
3. GPS NMEA – Serial Interface

A GPS module connected via the Ambient Serial Interface can be controlled from a computer through **USB 1**.

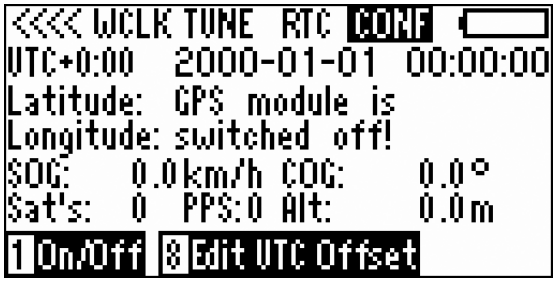
Please note: Prior to use any GPS function always verify that the GPS receiver emits valid data in menu **CONF > 6: GPS**.
Also, do not activate loop through by USB mode when planning manual GPS offset control as per **6.** or when using GPS to tune or set the generator.

6: GPS Extension:

When no ACCSI (Ambient Serial Interface)is connected to the ACC501, the message “No GPS Module attached” is displayed in the fields for longitude and latitude:

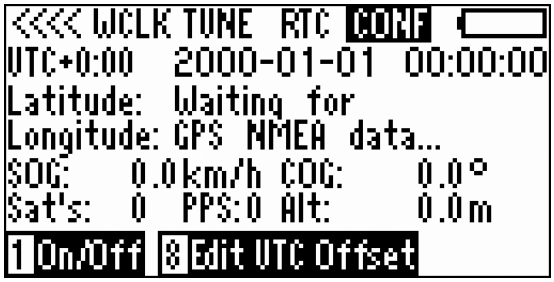

<<<< WCLK TUNE RTC CONF
UTC+0:00 2000-01-01 00:00:00
Latitude: No GPS Module
Longitude: attached!
SOG: 0.0km/h COG: 0.0°
Sat's: 0 PPS:0 Alt: 0.0m
1 On/Off 8 Edit UTC Offset

If a ACCSI with GPS receiver is connected to the ACC501, it is powered off by default. “GPS module is switched off” will be displayed in the fields for longitude and latitude:

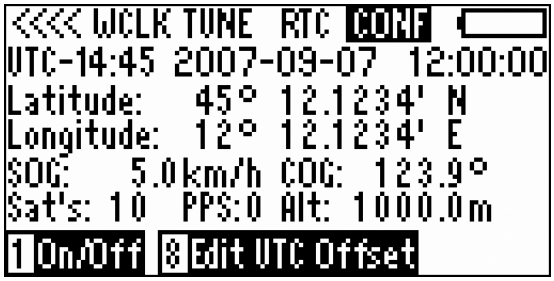

<<<< WCLK TUNE RTC CONF
UTC+0:00 2000-01-01 00:00:00
Latitude: GPS module is
Longitude: switched off!
SOG: 0.0km/h COG: 0.0°
Sat's: 0 PPS:0 Alt: 0.0m
1 On/Off 8 Edit UTC Offset

Please note: To save power the GPS module should only be switched on when needed.

After switching the GPS module on by pressing key 1, at first the message “Waiting for GPS NMEA data… “ is displayed.


<<<< WCLK TUNE RTC CONF
UTC+0:00 2000-01-01 00:00:00
Latitude: Waiting for
Longitude: GPS NMEA data...
SOG: 0.0km/h COG: 0.0°
Sat's: 0 PPS:0 Alt: 0.0m
1 On/Off 8 Edit UTC Offset

Once the GPS antenna has established link with enough satellites to emit valid data, the fields for longitude and latitude will be filled with values and refreshed permanently.


<<<< WCLK TUNE RTC CONF
UTC-14:45 2007-09-07 12:00:00
Latitude: 45° 12.1234' N
Longitude: 12° 12.1234' E
SOG: 5.0km/h COG: 123.9°
Sat's: 10 PPS:0 Alt: 1000.0m
1 On/Off 8 Edit UTC Offset

Using the command “8 – Edit UTC Offset”, the GPS time should be adjusted to the local time zone. The offset can be adjusted in steps of 5 minutes, as some countries have an offset that is not full hours. The offset is displayed on the top left (in the graphic above: UTC – 14:45)

4.2 GEN menu

In this menu the time code generator parameters can be set. The generator starts from 00:00:00:00 and can be set from the following sources:

Press 1, Preset: Set generator from different sources

Select 1, RTC: sets generator to internal real time clock
Set: time, user (date and or user bits), both

Select 2, RESET: sets selected bits to zero and generator starts counting
Set: time, user, both.

Select 3, AUX: sets time code from standby Time code generator
Set: time, user, both

Select 4, GPS: sets generator to GPS time
Set: time, user, both

Press 8, Edit: Manually edit the time, user bits and frame rate

Select 1: Time / Select 2: User bits / Select 3: Frames

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.3 LTC menu

In this menu the internal and the external **LTC** are shown including **frame rate**, **user bits** and **time code offset in 1/100 frames**.
The menus allow various actions to be taken using the internal **LTC generator** and the **external LTC**. The **EXT LTC** can be present on the Lemo input, the 3.5mm mini jack or the accessory socket.

Press 1, Send: Connects LTC to all TC out pins

A square wave icon appears next to Int. Press again to disconnect

Press 2, Jam: Jams the internal generator once to the external LTC

Select: 1: Time / 2: User bit / 3: Both

The frame rate is not changed. This allows time transfer from one frame rate to the other. No time error when jamming between integer frame rates or between pull down frame rates.
Incremental errors will occur if say 24 Fps external is used to jam 23.976 or 29.97 internal. When drop frame rates are jammed to non-drop rates time code offsets will occur.

Use non-drop time code for location recording.

Press 4, Snapshot: Freezes display

Use when one needs to note TC values. Press again to release. Notre: all functions carry on. Only the display is frozen.

Press 5, Run/Stop: Stops and runs the time code generator

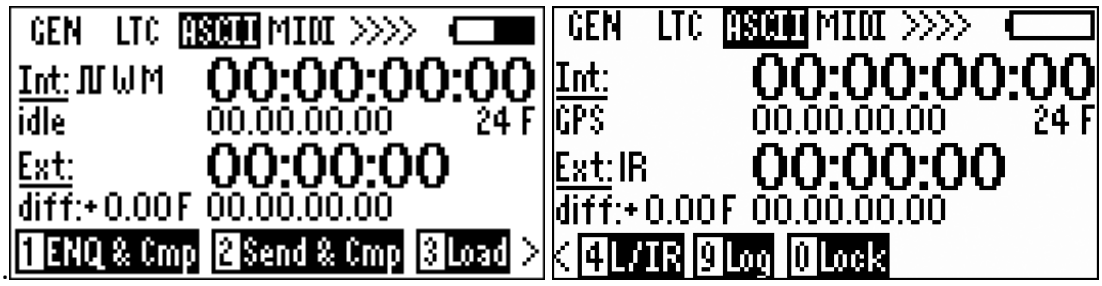
This is a test mode and will stop the generator and restart it. To avoid inadvertent stopping of the generator ENTER must be pressed to activate. This feature can be used to test other time code equipment. When restarting the generator after stopping, **Idle** will be show, to indicate that the generator is not jammed to any source.

Please note: Time will be lost if **Run, Stop** is pressed. To retrieve time code reset generator from the aux generator in the **GEN** menu.

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.4 ASCII menu

In this menu time code can be sent, received and compared using the Aaton ASCII protocol. This protocol sends and receives ASCII messages about time code and is not a continuous data transfer. The Ambient IR interface also can be used to communicate this protocol with external time code equipment cable free.



Press 1, ENQ & Cmp: Sends and receives message to enquire and compare status of the connected device and returns status to the display.

Press 2, Send & Cmp: Sends and receives message from connected device and compares to check if correct time has been set.

Press 3, Load: Sends and receives message from selected device and loads value into generator.

Select: 1: Time / 2: User bit / 3: Both
Press 4, L/IR:

The Aaton-ASCII protocol can be transmitted either via the Lemo connector or the infrared interface. Pressing key 4 “L / IR” toggles between infrared and Lemo connector:
When set to infrared, the token “IR” is displayed next to “Ext:”
The procedure of setting or enquiring of the time is identical for Lemo or IR-interface.

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.5 MIDI menu

Changes the status of the midi time code (MTC) generator.

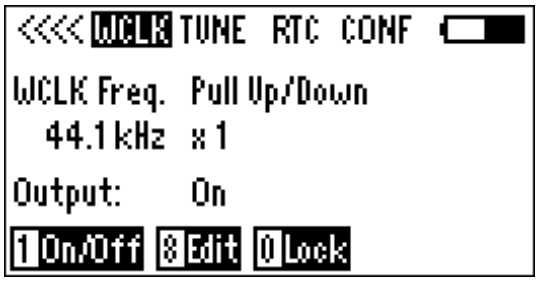
Press 1, On/Off: Turns the MTC output on or off.

Please note: When the MTC generator is "on" a **M** will appear in the Gen TC line of the LTC menu.

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.6 WCLK menu

The word clock menu controls the parameters of the word clock and turns the word clock generator on or off.
44.1 KHz to 192 KHz clock rate with pull up and pull down are provided.
All word clocks are generated by integer division from a resonator oscillator in fundamental mode and have sub-nanosecond jitter.



Press 1, On/Off: Turns the word clock generator on or off.

Please note: When the word clock generator is "on" a **W** will appear in the Gen TC line of the LTC menu.

Press 8, Edit: Changes the word clock settings

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.7 TUNE menu

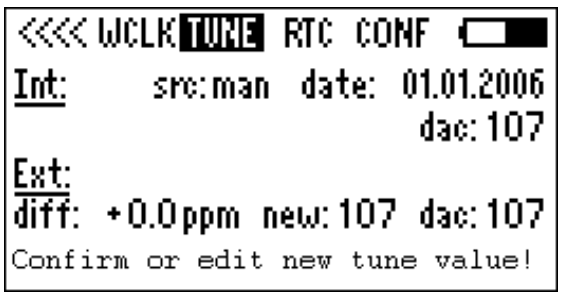
This menu is used to tune (calibrate) other Clockit devices or for the Controller to calibrate its reference oscillator to an external source.
The internal reference can be tuned to + - 10ppm with a resolution of 0.15 ppm per digit. The tuning number DAC is shown on the display as well as recent tuning history. The tuning process may have to be carried out several times if the tuning error is large (over 4ppm). The tune values are estimated and the final value approached and met after up to 5 tune processes.

Please note: Always make sure that the time code output is turned off when tuning intern or extern to avoid re-jamming a ACL202CT (up to firmware 8.2 it will rejam every 5 seconds and thus cause false readings when the oscillator is not tuned in yet) or crosstalk from the time code signal. If time code out is “on”, you will get a warning message to turn it off first.

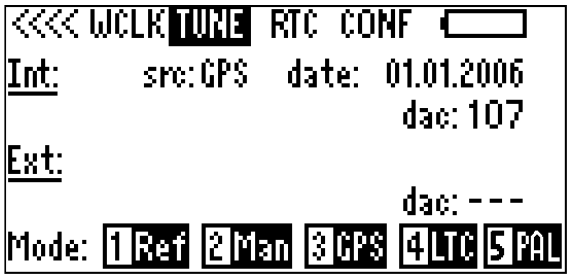
Press 1, Tune extern: The device connected can be tuned to the Controller.
Please make sure “tune signal out” is off, i.e. no wave symbol displayed next to “INT” (see command # 3).

Press 1, Ref: The tuning reference signal of the external device is scanned and compared to the internal clock. This is the most used mode as the controller is master in most cases.
After scanning, the DAC value of the external device is read out and a new DAC or “tune value” proposed. You will be asked to "confirm or edit new tune value". To confirm, press "Enter". To change values, use the "Up" or "Down" Keys.
Repeat tuning until difference is not more than 0.1 ppm.

Press 2, Man: The tune steps can be entered manually. (1 DAC value difference equals 0.15ppm)



Press 2, Tune intern: This function allows calibrating the controller's internal reference oscillator to an external source.
Please make sure "tune signal out" is off, i.e. no wave symbol displayed next to "INT" (see command # 3).



Press, 1 Ref: Calibrates the controller's internal oscillator to another Clockit device's reference signal such as an ACLxx, ACD301, ALL601, a Sound Devices 7'series recorder, an Arri Alexa or other 3rd party products which have a Clockit system built in.
After scanning, the DAC value flashes you will be asked to "confirm or edit new tune value". To confirm, press "Enter". To change values, use the "Up" or "Down" Keys.
The ACC501 automatically rescans .
Repeat tuning until difference is not more than 0.1 ppm, exit by "ESC"

Press 2, Man: Manually shifts the Controller's internal reference oscillator in 0.15ppm steps.

Press 3, GPS: Calibrates the Controller's internal reference oscillator to a GPS source having the 1 second timing pulse.
Repeat tuning until difference is not more than 0.1 ppm, exit by "ESC"

Press 4, LTC: Calibrates the Controller's internal reference oscillator to an external LTC. The Controller measures the LTC till enough error has accumulated to make a calculation to tune the internal reference.
The external time code is scanned for a minute. If this results in a value with low enough jitter, tuning is continued. If there is too much jitter, the scan is repeated for a 10 minutes period.
Repeat tuning until difference is not more than 0.1 ppm, exit by "ESC"

Press 5, PAL: The incoming video signal present on the "EXT.SYNC" BNC connector is scanned, the difference displayed and a new DAC (tune value) proposed. Press "enter" to write new tune value into memory. Repeat procedure until difference is not more than 0.1 ppm
Repeat tuning until difference is not more than 0.1 ppm, exit by "ESC"

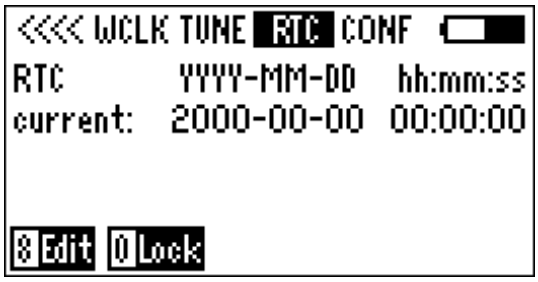
Press 3, Tune signal on/off: For board revisions “A” or later: it is now possible to tune one Controller from another.
The reference Controller has to send out the “Tune signal”, a 1.92 MHz clock.
When Tune signal out is “on”, a little wave symbol is displayed next to “INT”
Toggle “on – off” by pressing key 3.

Please note: When Tune signal out is “on”, external devices can not be tuned, nor does “Tune intern” function. This function is exclusively for putting the ACC501 in a slave mode to be able to tune another unit using it as reference!

Press 0, Lock: Locks out keypad. Release with shift + lock.

4.8 RTC menu

This menu sets the Real Time Clock. The RTC runs from its own battery and X-tal oscillator and contains all calendar data such as days in the month, leap year etc. It is an independent on board clock with its own battery and crystal.



Please note: **The RTC does not run from the tuned internal reference and is not as accurate.** It is used only to retrieve the actual time of day and the date when starting the time code generator.

Press 8, Edit: The RTC parameters can be changed or corrected manually.

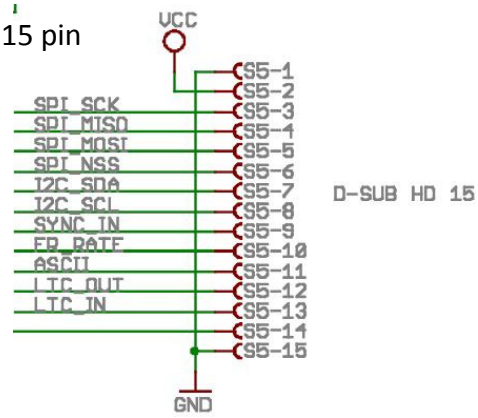
Press 0, Lock: Locks out keypad. Release with shift + lock.

5. Technical Data:

Powering: Batteries: 4x AA-battery (Mignon-battery, each 1.5V)
Extern power via Lemo-connector: max. 12Volt
Pin 1: Ground,
Pin 4: DC 5 –12 Volt
Via USB-connector

Connectors: LEMO 5pin, FGG/JGG.0B.305.CLADxx(ZN)
Pin 1: Ground
Pin 2: TC in, nominal level 100 mV min., DC decoupled
Pin 3: Aaton ASCII protocol in/out
Pin 4: Tune signal @ 1.92 MHz or ext. power max. 12Volt
Pin 5: TC out, TTL level
3,5 Mini jack
Tip = LTC-OUT 1 Volt pp
Ring = LTC-IN
Sleeve = Ground
USB 1 and 2
Pin 1: VBUS +5 VDC
Pin 2: D- Data -
Pn 3: D+ Data +
Pin 4: NC
Pin 5: GND Ground

SUB-D 15 pin



Communications parameters:

	Lemo socket	Infrared
Baud rate	2400	115200
Data bits	8	8
Parity	no	no
Stop bits	1	1

Dimensions (housing): 14cm x 7,6cm x 3cm
Weight: 300 grams (no batteries)

6. Warranty & Approvals

6.1 Warranty

Ambient Recording GmbH warrants the Clockit Master Slate ACD301 RF time code slate against defects in materials and workmanship for a period of ONE (1) year from date of original retail purchase. This is a non-transferable warranty that extends only to the original purchaser. Ambient Recording GmbH will repair or replace the product at its discretion at no charge. Warranty claims due to severe service conditions will be addressed on an individual basis. THE WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. AMBIENT RECORDING GMBH DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. AMBIENT RECORDING GMBH IS NOT RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH OF WARRANTY OR UNDER ANY OTHER LEGAL THEORY. Because some jurisdictions do not permit the exclusion or limitations set forth above, they may not apply in all cases.

For all service, including warranty repair, please send the ACD301 RF, along with proof of purchase date to your retailer, or, if not applicable, to:

Ambient Recording GmbH
Schleissheimer Str. 181 C
DE – 80797 Muenchen, Germany

Please obtain a return authorization through the contact form on our website before sending in a unit.

6.2 Approvals

CE Conformity Statement:

Declaration of Conformity

Manufacturer's Name:	Ambient Recording GmbH
Manufacturer's Address:	Schleissheimer Str. 181 C DE – 80797 Muenchen, Germany

declares that the product:

ACC501 Clockit Controller

is in conformity with:

Document No.
EN 50 022:1998 + Corrigendum July 2003 + A1:2000
+ Corrigendum April 2003 + A2:2002
EN 50 024:1998 + A1:2001 + A2:2003
Test Report No. 50139-060906 (Edition 1)
by SENTON GmbH, EMC-Test Center
DE-94315 Straubing
January 26th 2007

FC FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

NOTES:

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